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CHRONOLOGICAL ANALYSIS OF THE VARIOUS PAPERS HITHERTO PUBLISHED ON THE GEOLOGY OF THE UPPER SECONDARY AND TERTIARY FORMATIONS OF THE UNITED STATES.

REMARKS.

THE following communication has been drawn up with the sole view of assisting the geologist in his researches into a most interesting series of American strata. The papers here noticed are chiefly scattered through the various periodical journals which have appeared during the past eighteen years. In arranging these memoirs, explicit regard has been given to the order of time in which they appeared;—and their titles are followed by a brief analysis of the contents of each.

CRETACEOUS GROUP, OR UPPER SECONDARY STRATA.

This formation embraces the older marls and ferruginous beds which extend from New Jersey through the southern states, and skirting the Gulf of Mexico, ascend high into Missouri. Connected with these are other beds of a calcareous character, overlying the former and more recent, but belonging to the same geological series.

MEMOIRS.

I. The first scientific notice of this formation is contained in a memoir by Mr. Maclure, entitled, "Observations on the

Geology of the United States of North America," &c. Read before the American Philosophical Society, May 16, 1817, and published in their Transactions, New Series, vol. i. In this paper, (which was subsequently issued in an octavo volume,) Mr. Maclure observes, that "In the *Alluvial* of New Jersey, about ten to twenty feet under the surface, there is a kind of greenish blue marl, which they use as a manure, in which they find shells, as the Ammonite, Belemnite, Ovulite, Chama [Exogyra] Ostrea, Terebratula," &c.

II. The next scientific notice of the Marl district is contained in Dr. Mitchell's Notes to the American edition of Cuvier's Theory of the Earth, published in New York in 1818, p. 384, &c. Dr. Mitchell gives some brief notices of the marls of Monmouth county, New Jersey, and enumerates the following fossils as found therein: Belemnites, Gryphea, Baculites, "a peculiar oyster," and "a tooth and part of the jaw of a lizard monster, or saurian animal, resembling the famous fossil of Mæstricht." Of the latter and the Belemnite, good figures are given.

The "peculiar oyster" has since been described as the *Exogyra costata*, by Mr. Say; and the "saurian animal" has been long since unequivocally identified with the Mosasaurus of Coneybeare.

III. "Observations on some species of Zoophytes, Shells, &c. principally fossil. By Thomas Say."

This paper was published in the American Journal of Science, vol. ii. p. 34, &c., November, 1819. It describes, specifically, the five following speciés of fossils: Baculites ovatus, B. compressus, Ostrea convexa, Exogyra costata and Terebratula plicata.* Mr. Say names several other fossils generically, and calls the marl *Ancient Alluvial.*

IV. "Notice of the Alluvial District of New Jersey, with remarks on the application of the rich marl of that country to

* T. Sayi, so called by Dr. Morton, because its original name was preoccupied.

Agriculture. By James Pierce, Esq." Amer. Journ. of Science and Arts, vol. vi. p. 237, &c. 1823.

As the title of this memoir imports, its object is chiefly agricultural, embracing also some important facts in the physical history of the peninsula of New Jersey. Some of the fossils previously described by Mr. Say, are alluded to generically; and the author speaks of the bones of the Elephant, Rhinoceros,* Deer, Whale and Shark, and certain shells as all occurring in the Marl; an error which readily accounts for the following equally erroneous inference: "The origin of these banks of shells and bones may, I think, with propriety be ascribed to the Deluge recorded in sacred history."†

V. "On an extinct species of Crocodile, and some observations on the Geology of West Jersey. By R. Harlan, M. D."

This memoir was read before the Academy of Natural Sciences in 1824, and published in their Journal, vol. iv. p. 15. The author describes and figures the fossil remains of a Crocodile from the Ferruginous sand, mentions several characteristic genera of Testacea, and refers the formation to the Tertiary period.

VI. "Notice of the Plesiosaurus and other fossil reliquiæ from New Jersey. By R. Harlan, M. D." Read before the Acad. of Nat. Science, in 1824, and published the same year in vol. iv. of their Journal.

This paper describes and figures the supposed Plesiosaurian

* It may be here remarked that remains of the Rhinoceros have not been found in North America.

† About this time appeared a "Geological Essay on the Tertiary Formations of America. By John Finch." This paper was read before the Academy of Natural Sciences of Philad., July 15, 1823, and published in the American Journal of Science, vol. vii. 1824. Mr. Finch appears to have been the first geologist who detected the *Tertiary* formations in this country, and in this respect his memoir is of great value. But, with a singular confusion of materials, he refers the Bog Iron ore, Ochre, and Pudding stone of New Jersey, to the Ferruginous sand series, and dismisses the whole in six lines copied from Mr. Maclure, without making the least allusion to organic remains of any kind; whence it is obvious that Mr. Finch was acquainted only with the *alluvial* beds of New Jersey, and that the cretaceous deposits were unknown to him.

remains, the tooth of a Mosasaurus, and the teeth of several species of shark.

VII. "Report on several multilocular shells from the state of Delaware, &c. J. E. Dekay, M. D."

This memoir was read before the New York Lyceum of Natural History, in October, 1827, and published the same year in vol. ii. of their Journal. The author describes and figures the *Ammonites placenta*, and *A. hippocrepis*, which last is a Scaphite. As the references to the accompanying plate are all wrong, it may save the student some trouble to inform him that fig. 2 is the A. placenta, and fig. 5 the A. hippocrepis.

VIII. "Description of a new species of Ostrea, &c. By S. G. Morton, M. D." Journ. Acad. Nat. Sc. vol. vi. 1827.

This paper is chiefly confined to a description of the *Ostrea falcata*, and is accompanied by a plate.

IX. "Geological observations on the Secondary, Tertiary, and Alluvial Formations of the United States, arranged from the notes of Lardner Vanuxem, by S. G. Morton, M. D." Read before the Academy of Natural Sciences, January 8th, 1828, and published in the sixth volume of the Journal of the Academy.

This memoir is chiefly devoted to the geographical distribution and distinctive organic characters of each of the formations mentioned in the title. To Mr. Vanuxem belongs the credit of first suggesting the analogy between the secondary arenaceous deposits of the United States, and the chalk series of Europe. "None of the characteristic fossil shells of this formation," says he, "have ever been found in the overlying tertiary deposits of the southern states; nor have they been found to characterize any deposition in Europe, more modern than the chalk. The shells therefore, being generically analogous to those of the chalk, the two formations are to be considered contemporaneous."

Mr. Vanuxem notices the characteristic organic remains, and considers the great Lignite deposit of the Atlantic coast to rest upon the marl.

X. "Descriptions of the Fossil shells which characterize the Atlantic Secondary Formation of New Jersey and Delaware, including four new species. By S. G. Morton, M. D." Read December 11th, 1827, and January 1st, 1828. Published in the Journal of the Academy, vol. vi. With four plates.

This paper was published by its author as a supplement to the preceding one, by Mr. Vanuxem. It describes, specifically, the characteristic fossils of the marl formation, belonging to the genera Terebratula, Gryphæa, Exogyra, Ammonites, Baculites, and Belemnites.

The author notices several analogies between the American arenaceous marl, and the European *Green sand*, and adds: "While the ammonites, baculites, the monitor &c., remind us of the mountain of Maestricht, other reliquiæ denote a considerable affinity between this formation and the *green sand* of Europe." This, so far as we know, is the first intimation of a specific analogy, which has of later years been most satisfactorily demonstrated by the same geologist.

XI. "Description of two new species of fossil shells of the genera Scaphites and Crepidula, with some observations on the Ferruginous Sand &c. of the U. States. By S. G. Morton, M. D." Read before the Academy of Natural Sciences, June 17, 1828, and published in the Journal of the Academy, vol. vi.

The author of this paper, besides describing and figuring the fossils mentioned in the title, takes a view of the Lignite deposits, and gives a somewhat extended notice of the analogies observable in the strata of Europe and America, and adds: "In a former paper I instituted a brief comparison between the fossil shells of the *green sand* of Europe and those of New Jersey and Delaware; all the observations I have since made have confirmed me in the opinion that these formations are contemporaneous."

XII. "Note: containing a notice of some fossils recently discovered in New Jersey. By S. G. Morton, M. D." Read before the Acad. Nat. Sciences, June 2, 1829, and published in Jour. Acad. Nat. Sc. p. 120.

This paper contains the first notice of the *calcareous* beds of the chalk formation of America. These beds as they occur in N. Jersey, are particularly described, and their fossil remains pointed out: viz. Gryphæa, Spirorbis, (Vermetus) Spatangus, Cidaretes, Teredo, Anthophyllum, Eschara, Flustra, Retepora, Alcyonium &c. &c. and the analogies between the European and American formations are more fully investigated.

XIII. "Synopsis of the organic remains of the Ferruginous sand Formation of the United States; with geological remarks. By S. G. Morton M. D." Published in the Amer. Journ. of Science, vol. xvii. pp. 274 to 295. 1830.

This is the first of a series of papers designed to give a detailed exposition of the geographical distribution, and the mineralogical and organic characters of the deposits in question.

XIV. Continuation of the same paper, 1830, same Journal, vol. xviii. p, 243 to 250.

This paper describes a number of new fossil species, and is accompanied by three plates and forty-six figures. The author also makes some additional remarks on the calcareous deposits, and observes that the "calcareous and arenaceous strata have the same relative position as the chalk and green sand of Europe."

XV. "On the remains of extinct reptiles, of the genera Mosasauras and Geosaurus, in the secondary formation of New Jersey. By J. E. De Kay, 1830." Annals of New York Lyceum vol. 3, P. 134.

The author's object is chiefly to establish the occurrence in our marls, of the Saurian animals mentioned in the title. This is accomplished with elaborate care. Dr. De Kay also mentions that he had detected *Coprolites* in the same formation.

XVI. "Additional observations on the geology and organic remains of New Jersey and Delaware. By S. G. Morton, M. D." Read before the Acad. of Nat. Sc. in Jan. and July, 1830, and published in their Journal, vol. vi. p. 189.

This memoir is chiefly directed to fix the specific characters of various fossil shells and Echinodermata, and especially of the Ammonites and Belemnites. A plate accompanies the paper.

XVII. "On the analogy which exists between the marl of New Jersey &c. and the chalk formation of Europe." Letter from S. G. Morton, M. D. to Prof. Silliman, Feb. 14, 1832, and published in the American Jour. of Science, vol. 22, p. 90.

In this place Dr. Morton gives a further exposition of his views, and publishes at large the corroborative sentiments of M. Brongniart and Mr. Mantell.

XVIII. Supplement to the "Synopsis of organic remains of the Ferruginous sand Formation of the U. S. By S. G. Morton, M. D." American Journal of Science. Vol. 23. p. 228 to 294.

Chiefly devoted to the geographical distribution of this formation, and a considerable number of new species of fossils illustrated by two plates.

XIX. Same paper continued. Amer. Jour. of Science. Vol. 24, p. 128. 1833.

The author here designates the upper secondary strata by the name of the *cretaceous group*, making two great divisions, the calcareous, or upper, and the ferruginous sand, or lower strata. Many new fossils are embraced in this paper, which is illustrated by two plates.

XX. "Synopsis of the organic remains of the cretaceous group of the United States. By S. G. Morton M. D." Philadelphia. Key and Biddle, 1834.

This is a volume of about 100 pages, in which the author has embodied all the facts contained in his former essays, together with much new matter, including a great number of new species of fossils. Independent of the remains of reptiles and fishes, there are specific descriptions of one hundred and three species of shells, echinodermata, and polypi, respecting which, the au-

thor observes, that only eight have been described, and four of them figured by other naturalists. The work is illustrated by nineteen plates, containing 170 figures.

XXI. "Geological report of an examination made in 1834, of the elevated country between the Missouri and Red rivers. By G. W. Featherstonehaugh, U. S. Geologist. Washington. 1835."

This is an octavo of 97 pages, and among much interesting matter, embraces a sketch of the geographical distribution of the cretaceous strata, and a notice of some fossil localities.

The author gives, we conceive erroneously, the name *subcretaceous* to those American strata which are equivalent to the cretaceous group of Europe. It is well known that the latter appellation is used in a geological and not in a mineralogical sense, and embraces the whole chalk series; while the term *subcretaceous* might be more correctly applied to *any* formation that happened to be *next below* the cretaceous strata: in the same manner that De la Beche and others give the name *supercretaceous* to the beds *above* the chalk.

XXII. In a communication made by Dr. Morton to the Academy of Natural Sciences in March, 1835, (and since published as an Appendix to his *Synopsis*, and also in the American Journal of Science for July, 1835,) he proposes three divisions of the American cretaceous group, viz.: the ***Upper***, ***Medial*** and ***Lower***, each of which possess certain characteristic fossils. The Upper and Medial divisions embrace the calcareous strata; the Lower division the Ferruginous sand.

Note. Gordon's Gazetteer of New Jersey, 1834, contains, in the preface, an exposition of the Geology of New Jersey, taken verbatim, and without acknowledgment, from Dr. Morton's Synopsis, in the American Journal of Science.

(To be continued.)

GEOLOGY. No. V.

By H. Gibbons, M. D., of Wilmington, Del.

Recapitulatory remarks.—We have taken a transient survey of those rocks called primary, which appear to have been formed prior to the creation of plants and animals. In general, they repose at some distance beneath the surface of the earth. When subject to our inspection, it is either in mountainous districts where they seem to have been projected by violence above their common level, or in places where they have been denuded by the action of running water, or exposed to view by the labors of the miner. Their crystalline structure shows that they were formed by the agency of chemical causes; most probably they were consolidated from a state of fusion.

Transition strata introduced.—The primary rocks being constructed, a very important epoch in the history of creation occurs. The era of animation now begins. A few races of animals endowed with the inferior attributes of life, form the first link in the chain. The newly made strata are broken down by the waves and currents of the universal ocean, and their fragments afford materials for the formation of another class of rocks. Hence result successive deposits, which exhibit by their composition and their mechanical structure, the causes to which they owe their origin. By the older geologists, the term, *transition*, was applied to this series of formations, because, at the time of their deposition, our planet appears to have experienced a transition from an uninhabitable, to an inhabited state.

General character of the transition rocks.—It has just been remarked that these strata exhibit the effects of the action of the elements on the older rocks. The transition formations are little more than the debris of the primary. They have a slaty structure, and are composed of aggregated particles, which vary in size, from a fine sand, to the coarsest fragments. Some of them are partially crystallized, showing the combined action of chemical and mechanical causes. Interspersed among these fragmentary deposits, are occasional beds or strata of limestone.

Their position.—The transition rocks generally conform to the position of the primary which repose beneath them. Consequently, where they form a part of mountain ranges, they appear on the surface, nearer to the base of the mountain than the primary, and inclined against them, often almost in a vertical position.

When were the first animals and plants created?—We have no mode of determining the existence of organized beings at a remote period, except by the relics which are buried in these rocks, the origin of which is referrible to that date. From the firm texture of plants, we are authorized to infer that some traces of the first vegetables would be handed down to us associated with the strata which were cotemporaneous in their origin; and hence, that the relative date of the commencement of vegetable life is within the scope of human knowledge. But it is not so with animals of the lowest grade. Many of these are so soft, and so easily disorganized as to render it impossible for them to leave any definite impressions of their existence. The Medusa family, for instance, are composed of little else than a gelatinous mass, the organization of which would be entirely effaced by agitation in water. Had such beings existed during the construction of the primary strata, it is plain that no traces of their structure could have been transmitted to us. Quantities of bituminous matter, such as would result from the action of heat on animal bodies excluded from the air, are sometimes detected in the primary rocks; and it has been suggested that these bituminous deposits have so originated. But let us reflect what sort of animals are best adapted for a habitation, such as the world then was;—an expanse of waters constantly liable to the disturbing influence of the most violent causes. What creature is better fitted for this scene of commotion than those whose remains are buried in the oldest fossiliferous rocks? —animals almost devoid of sensation, with wants few and easily supplied, and protected by an encasement of hardest shell. By this consideration, coupled with others which must present themselves to every mind, I am induced to regard those beings whose relics are entombed in the lowest transition strata as the first animated tenants of the globe.

Transition slate. The transition strata, I have before remarked, are made up of a series of slaty, fragmentary rocks, derived from the ruins of the primary, interspersed with beds of limestone and argillite or clay slate. The latter is mostly found resting on the older strata, being the deepest formation of its class. It differs in no essential feature from the primitive slate already described, except that it contains some remains of animals. There is no distinct line of separation between the primary and transition strata; in other words, between the non-fossiliferous and the fossiliferous rocks. On the contrary, beds of primitive slate alternate with beds of transition slate, and thus the two classes are blended together. Transition slate is used for the same purposes as the primitive, affords the same soil and scenery, and is also rich in metallic ores.

Grauwacke Slate. Under this uncouth appellation is embraced the great mass of the transition strata, consisting of the fragmentary deposits before spoken of. The name, which signifies *gray slate*, was applied by the Germans, and has been adopted by the English geologists, for some other reason perhaps than its euphony. The grauwacke, or graywacke slates, are a series of deposits composed of particles of various sizes, worn from the primary strata by aqueous currents, and cemented together by an earthy paste. They possess a structure more or less slaty. Some of the grauwacke strata are composed of particles so fine as to give the rock the character of sandstone, while others contain fragments and pebbles of considerable magnitude.

Metals in Grauwacke. There are few rocks so rich in metals as the grauwacke group. The mines of the Hartz in Germany, which yield annually 60,000 cwt. of lead, are in this formation; and the celebrated mines of Potosi are said to be in the same rock.

Fossils in Grauwacke. Although in the lower transition rocks, the relics of animals are few in number, yet they increase rapidly as we ascend, showing a rapid increase in the population of the earth during the period of their deposition. These relics consist mostly of marine shells, and a singular

animal, partaking of the character both of a shellfish and an insect. It appears to belong to the crustaceous order, so called because the animals are furnished, like the lobster and crab, with a crustaceous or shelly covering. The name *trilobite* has been given to it on account of its three-lobed appearance. There are several species of this curious creature, all of which are limited to the transition rocks, and to a few of those strata immediately above. The whole race became totally extinct at a very remote period, as no remains of trilobites are discoverable in any of the strata more recently found. Besides the shellfish and trilobites, there are also found in these rocks the remains of a few species of fish. Occasionally, we observe also the impressions of plants, the habits of which, as might be expected, seem to have been aquatic.

Localities of Grauwacke. The fragmentary rocks which I have described are extensively diffused over the earth, being found in almost every country. From this circumstance we may infer the universality of the causes by which they were formed. They abound in the valley of the Arkansas; and it is probable that when the geology of that region shall have been thoroughly explored, they will be found to underlie a great part of the western section of the United States.

Transition Limestone. The limestone, which I have already noticed as one of the transition strata, differs from the limestone of the primary series, in being less perfectly crystallized, and containing fossil remains. Sometimes it consists altogether of fragments of various form and size, cemented by a calcareous paste. In comparison with the grauwacke deposits, among which it is interspersed, this is a very partial formation. But in some countries it exists in great abundance. Its most familiar situation is in mountains, where it is found often at a great height, forming no small portion of the mountain. From this circumstance, it has acquired the name of *mountain* limestone. In these situations, it conforms to the strata beneath, being frequently so much out of the horizontal position as to stand almost perpendicularly.

Fossils in Transition Limestone. Some of these rocks abound in fossils, generally the remains of ancient marine animals. The

trilobite, before described, is common in the transition limestone. It was discovered in a formation of this character at Dudley, England, and is hence occasionally called the Dudley fossil.

Ores in Transition Limestone.—This rock is rich in metallic ores: the mines of Cornwall are partly situated in it. Zinc, tin, lead and copper are the metals that it mostly contains.

Transition Marbles.—The greater proportion of the variegated marbles disseminated throughout the world, are of the transition class. There are numerous localities of this marble in the U. States, of which I will mention only one, the Potomac marble, which is found on the Potomac river, fifty or sixty miles above the city of Washington, and is composed entirely of rounded pebbles agglutinated together. The shafts of the columns in the Representative hall of the capitol in Washington are polished blocks of this marble.

Caverns and subterranean Rivers.—The phenomena of subterranean caverns, occur with greater or less frequency in all limestone countries. Owing, perhaps, to the irregular operation of the causes that gave rise to this rock, some parts of it are much softer than the rest. These soft beds being washed out by subterranean streams, occasion excavations and caverns of considerable magnitude. Rivers are sometimes ingulphed in mountain limestone by being precipitated into these caverns, and rise again at a distance of several miles, to the surface of the earth. There is a mountain in Derbyshire, Eng., containing twenty-eight caverns of this kind, called by the natives, *swallow holes.*

Historical deductions from the transition strata and reflections on them. I have now described the principal strata of the transition class. It is deeply interesting to the geologist to inquire from what source, and in what manner, originated the vast display of ruins they present to our view, not merely in accidental fragments, or in occasional beds and hills, but in strata covering millions of square miles, and rising frequently even into mountains. The Catskills in New York are conspicuous monuments of geological revolutions. Not only at their base, but at their summit, thousands of feet above the level of the Hudson river, we find those mountains composed extensively

of fragmentary rocks, rounded and angular, and the relics of myriads of shellfish: and their massive piles inform us that most of the materials of which they are built, were once loose and rolling about in the waves of the early ocean.

On the other hand, some of the transition rocks have been deposited during a very different state of things; for the plants and, animals they contain, present in many instances, few indications and sometimes not the least trace of violence or accident. Their most delicate parts are often perfectly preserved;—animals with all their organs entire, and plants with their fibres and leaves as fully expanded as when they opened their verdure and their bloom to the summer's sun, thousands and thousands of years ago. How beautiful and how inevitable is the inferrence that the little tenants of that primeval ocean, endowed by their organization with scarcely power to move themselves an inch, lived and sported out their day, died and were entombed all within a narrow circle of the spot where we now discover their habitations in the solid rock. What a sublime flight of the imagination to fancy oneself a witness of the grand changes and operations exhibited by the face of nature at that distant day, long, long, before the earth was trodden by the foot of man—when yet the surface of our planet was one wide waste of waters—when the creation of life had just begun, and the first link only, in the chain of animated existence had been formed.

THE POTATOE.

Concluded from page 359.

Having given as nearly as possible, the correct dates at which the potatoe was first known in different countries as an esculent root, we will now proceed to a cursory view of the vegetables with which it has been confounded, as they are mentioned in the first portion of this essay.*

*Since the publication of the last number of the Advocate, we have been informed by an eastern gentlemen that the potatoe was brought from Ireland to the New England states, in 1710.

The *papas* of Pierre Cieca, is apparently the same as the *Papas Peruvianum*, figured by Clusius. The following extract from Parkinson's Theatrum Botanicum, London, 1640, will elucidate the subject, and show that the plant so described was the *yam*, and not the potatoe:

In speaking of the varieties of the plant then known:

"There are many which serve instead of bread, familiar to the natives both of the East and West Indies, whose names onely are extant in those authours works that have written of them, without any further declaration either of forme, or any property, but that the roots are eaten by them, some being of better taste than others, and longer lasting, among whom, as I take it, the Igname or Inhame is a principall one, whereof Scaliger first, and Clusius afterwards, have given us the best information. Clusius saying, that it was also called by some, *Camotes*, *Amotes*, and *Aies*. All he saith of it is this; that some Portugall ships that were taken by the Hollanders, had divers of these roots in them, some bigger than others; for some as he saith were as bigge as ones arme, and of a foot long or more, others lesser, and some thicke and short, having some small tubers thrusting out at the lower parts of them, but all of them covered with an uneven and rugged barke, with many fibres at them; the substance of the roote within being white, soft, sappy, tender and as it were kernelly, and of no unpleasant taste, (that is the raw roote, for he saith he tasted it,) at the first, but a little rough and sharpe afterward; but being rosted under the embers it tasteth more tender than any chestnut, and somewhat like a peare, but saith he, what stalke or leafe it bore he could not understand of any: onely he saith that he received one that was sent him that had a sprout at the head of it which was broken off in the carriage, as the figure here expresseth it unto you; but *Lobel* in his *Adversaria*, saith that he understood that those rootes of the Inhame that were brought from Æthiopia and Guiney bore mallowlike leaves, (and differeth from those of Spaine and the Canary Islands, which are our ordinary great potatoe,) and such like leaves doth Lugdunensis give to an American plant called *Hetich*, whose roote is somewhat like it and edible. Clusius

also speaketh of another sort of these Inhames, which, as he saith some call *Yeam Peru*, but the Portugalls Inhame as the former, which although it were like the other, yet the barke was more uneven, and had as it were some knobs thereon with small fibres going from them, and from the head of the roote went out hard great stringes of a foot long, which were prickly for the most part. Clusius seems to referre the Virginia potatoes to the *Arachidna Theophrasti*, and Lugdunensis saith some did the Manihot, and that this Inhame was referred to *Theophrastus*, his *araco similis*. But *Bauhinus* his ovingum or vingum, and oetum by Pliny; so variable are mens conceites especially in things obscure or unknowne, or when they doe *raptim*, without due consideration *sententium proferre*. But Scaliger Exercitat. 181, 17, seemeth to know three other sorts besides the ordinary, which will abide good without perishing for a whole yeare; and therefore the Spaniards used to bring them to sea with them, and call it *Igname Cicorero*. The other will last nothing so long, whereof that which groweth in the countrey of Benim is of excellent rellish, but that of *Manicongo* is the worst, and that of Saint Thome, which is as yellow as a carrot is of most esteeme. The planting hereof, saith he is wonderful; for it is not done by putting the rootes into the ground, but a stalke taken therefrom cut in long peeces and holding some barke thereon, and so thrust into the ground, will in five moneths be good to be gathered, it hath, saith he, a leafe something like unto that of the citron tree, both in form and lustre, but smaller and thinner; it runneth on poles that are set for it like hoppes; the roote like the reede or dragons hath four or five suckers joined to it. This manner of planting this Inhame favoureth something of that of the Manihot or Jucca, whereof the Cassavi is made; if there be not a mistake, it is wonderful that two rootes should be so propagated."

Gerard also figures the potatoe in his Herbal which was published three years previously to Parkinson's work. He refers to the *Sisarum Peruvianum*, or skyrrets of Peru, which he says, Clusius calleth *Batata*, *Camotes*, *Amotes*, and *Ignames*. And that the "roots are many, thicke, and knobby, like unto the roots of peonies." Of these roots may be made conserves no less toothsome, wholesome and dainty, than of the flesh of quinces."

"They are used to be eaten rosted in the ashes. Some when they be so rosted infuse and sop them in wine; and others, to give them the greater grace in eating, do boil them with prunes, and so eat them." "Notwithstanding however they be dressed they comfort, nourish, and strengthen the body, vehemently procuring bodily lust."

The figure which accompanies the above description, does not correspond in appearance, to that of the common potatoe, which is also figured; but evidently is intended for the *sweet potatoe*,—CONVOLVULUS *batata*, which is a native of tropical climates, and was introduced into England by Sir Francis Drake and Sir John Hawkins in the middle of the 15th century. Several varieties of this useful plant are indigenous to tropical America.

In speaking of the former, Gerard observes that the Indians call it *pappas*, and that potatoe is the proper name, "because it hath not only the shape and proportions of potatoes, but also the pleasant taste and virtues of the same: we may call it in English, potatoes of America or Virginia."

The Yam,—DIOSCOREA *sativa*. A plant of the *Diœcia Hexandria* class, Nat. order, DIOSCOREÆ. It is said to have been named in honour of Pedicius Dioscorides, physician to Anthony and Cleopatra: though some suppose that he lived in the age of Nero. He wrote a book on medicinal herbs, which is still extant. Hughes says that it was formerly the peculiar growth of Africa, and probably derives its name from the verb *yam* to eat. It is a native of the east, from whence it was transplanted to the West Indies, and is found growing spontaneously and in great perfection on the island of Ceylon and the coast of Malabar, but has never been found indigenous in any part of America, though cultivated in the southern Continent. It was first taken to England in 1773: the root is farinaceous, like the potatoe, but of a closer texture. Lunan mentions six varieties of the plant, as growing in Jamaica.

ARACHIDNA *Theophrasti*. Parkinson says this is the same as the Yucca or Jucca, and is believed to be the cassava,—JATROPHA *manihot*.*

* Monœcia Monadelphia class, Nat. Ord. Euphorbiaceæ.

But the Yucca is entirely different from the manihot. There are several species belonging to the genus. The Yucca *gloriosa*,* has an edible root: it is a native of the South Sea Islands; its fruit is like a cucumber, of a purple color, and a juicy, aromatic, bitterish taste.

Botanists have enumerated nine species of the manihot, but only two are cultivated for human food; these are the bitter and the sweet cassava,—the *J. manihot* and *J. Janipha*. It is indigenous to America, and is much cultivated from Florida to the Straits of Magellan, and in many parts of Asia and Africa, as a principal article of food. The bitter cassava is highly poisonous in its natural state; but notwithstanding this, it is cultivated to a much greater extent than the other species, which is equally agreeable and wholly innoxious. The roots of the two are very similar in appearance, so that it is difficult to distinguish one from the other: by close inspection, however, it will be perceived that there is a tough ligneous fibre, or cord, running through the heart of the sweet cassava, which does not exist in the bitter variety; the former, moreover, becomes soft by boiling, which is not the case with the latter.

The tubers are spindle-shaped, much resembling parsnips in appearance; from fourteen to fifteen inches long, and four or five thick in the middle. In preparing cassava, the rind of the root is peeled off, and the latter ground or grated to a pulp, and subjected to pressure, that the poisonous juice may be expressed. When the pulp is thus freed from the juice, it is spread on a hot iron plate in cakes of about two inches thick; when crisp, the cakes are taken off the iron, and after becoming sufficiently cool, they are fit for use; these cakes will remain good for a very long period.

The bread thus made is palatable and wholesome, though it may taste harsh to persons unaccustomed to it.

The roots of the sweet cassava, after being roasted in hot ashes, are eaten by the Indians, as the process of grinding and extracting the juice is unnecessary. Both plants are propagated by cuttings, which quickly take root, and may be dug up and used about eight months from the time of being planted.

Sisarum *Peruvianum*, or *Skyrrets* of Peru. *Sisarro* is a Spanish name of the Sium *Sisarum*.† But the plant which Gerard describes

* Hexandria Monogynia class, Nat. Ord. Liliaceæ.

† Pentandria Digynia class, Nat. Ord. Umbellatæ.

and figures under the first name, does not belong to the genus *Sium;* it is the sweet potatoe to which he refers.

The *truffle,*—TUBER *cibarium.* This production which was also considered a species of potatoe, belongs to that singular family of plants, the Fungi. It is found growing in clusters, six or seven inches below the surface of the ground, and prefers a soil composed of clay and sand. There are eleven species of the truffle mentioned by Boerhaave.

The fruit of the *T. cibarium,* is nearly spherical, occasionally lobed, varying from a hazel nut to a large potatoe in size, and studdedo ver with pyramidal tubercles or warts ; it has no visible root. It is said that some are occasionally found in Italy weighing from 8 to 14 pounds.

Botanists enumerate three varieties of this species ; 1st, That which has the flesh of a dark color; this is most esteemed for its odor and tenderness, and does not ripen till frost. 2d, That which has a white flesh ; this will keep better, is less odorous, and ripens in the month of September. 3d, That which has the flesh of a violet color. It is affirmed by naturalists, who have examined the structure of the truffle with microscopic attention, that minute oval capsules, each containing from three to four seeds, are imbedded in its substance. Truffles are natives of the woods of Scotland and England, France and Italy. Some think however, that they are not aboriginals in England. Pliny mentions that they are found in Cyrenaria in Africa, and also in several parts of Asia.

Among the Romans, this fungi was in great esteem. At the present time it is much sought for among the European epicures, and its importation into our own country is by no means neglected.

As no intimation of their growth is exhibited on the surface of the ground, except when large clusters of them are growing together, in which case they raise a hillock of earth, those who hunt them are obliged to resort to the curious expedient of taking hogs and dogs along with them, both of which animals, and the former in particular, are very sagacious in discovering the subterranean prize by the sense of smelling. It is necessary to tie a rope to one of the hind legs of the royal pork, so as to prevent that fair opposition between the biped and quadruped hunters, at which the latter would certainly maintain the precedence. It is said that thunder and lightning

disposes the truffle to emit its particular odor, which is so alluring to hogs. Hence, the ancients thought them produced by thunder, on which account they called them *ceraunia*, or thunder roots. They are subject to be eaten by a worm, which, after undergoing its changes, escapes in the shape of a beautiful little violet coloured fly, which hovers over the places of its birth. By observing these flies, it may be known where to dig for the truffle.

Rafinesque says that there are several species of truffle in the U. States, differing from those of Europe, all of which are undescribed.

The *Tuckahoe* is another esculent fungus, which is indigenous to the southern states. On the authority of the same naturalist quoted in the preceding paragraph, there are three species: the TUCKAHUS *rugosus*, *leviusculus*, and *albidus*. He mentions having seen one of the first species which weighed forty pounds. They keep good for a considerable time.

With respect to the *openawk* of De Bry, we have been unable to glean any information. It has been suggested to us whether it might not be the APIOS *tuberosa* of Pursh; the root of which, says Nuttall, is edible and farinaceous, much like that of the LATHYRUS *tuberosus*, sold in some of the German markets. The causes which induce the belief of the openawk not being the potatoe, have already been stated.

It is difficult to determine what is referred to by d' Acosta, when he mentions the *chunno* or *chugna* of the Peruvians: so numerous are the esculent roots indigenous to South America. Humboldt mentions the following, one of which may possibly be the plant in question.

The CHENOPODIUM *quinoa* has a root which is a common article of food in Peru.

The roots of the *cacomite*, a species of TIGRIDIA, and the ARACHIS *hypogæa*, yield a nutritive farina.

The TROPÆLUM *esculentum* is a plant which does not require much moisture for its growth. The Mexicans and Peruvians preserve the roots for a series of years, by exposing them to the frost and then drying them; thus destroying their powers of germination.

The *Arracacha*. This is a species of OXALIS, which grows on the plains of Bogota, 8700 feet above the level of the sea. The main roots of the plant branch into four or five parts, which

attain the size of cows' horns. Attempts have been made to cultivate this root in England, and sanguine hopes entertained, that in course of time it might be made as useful as the potatoe. It is said to be the sweetest of farinaceous plants, having a taste much like that of a chestnut, and a fine, white flesh.

A slight examination of the different products which have received the name of potatoe, is here concluded : the results are believed to be as correct as the data at our disposal can make them. The difficulties connected with such an investigation can be seen, when the imperfect system of classification which prevailed upwards of two centuries ago, and the errors committed by early writers, in describing plants which they never saw, are considered. In the case of the potatoe, we see that almost every vegetable not indigenous to Europe, which possessed a tuberous root, was described as a species of that useful article. No matter how much the essential characters of the plants differed from each other,—whether they were farinaceous, succulent, or fungous productions, if they only possessed edible roots, it was all sufficient for them to be classed among the potatoes.

W. P. G.

For the Advocate of Science.

ON THE FASCINATING POWER OF SNAKES.

So much has been said of late years respecting the fascinating power of snakes, and so many facts adduced to prove this singular faculty, that no apology can be necessary for taking a view of the subject which may, perhaps, be new to some of the readers of the Advocate.

From the various tales that have been told respecting this curious power, one would be led to infer, that snakes exercise a very extraordinary influence on some birds, and other small animals: but unfortunately, many who would account for the phenomenon on the supposition of a certain fascination or charm, when they bring facts to confirm their theory, *prove too much.* For, not content with showing that small birds are subject to the enchantment, they would

fain make us believe that large animals—nay, even that *men* themselves become obedient victims to it: and that too, not in consequence of any spell which the eyes or countenance of the snake could possess! For it would appear from several statements lately made in some newspapers of the day, that the individuals charmed were at such a distance from the fascinating object, that neither the eyes, nor the expression of any *other part of the face*, could have influenced the spectators. One poor victim, at the distance of several yards, was attracted by a *copper head*, in such a miraculous manner, that he had nearly "grasped it in his hand." Another, just about aiming a deadly blow at a *rattle snake*, all at once saw the terrific animal transformed into the most beautiful object in nature: and was obliged to shut his eyes in order to break the charm. It would appear from these statements, that this strange fascination must be derived from the colors of these reptiles, or their peculiar faculty of varying them.

An Irishman informed me a few years since, that shortly after his arrival in this country, he saw extended along the ground, what he took to be a large *black strap of leather*. He bent eagerly after the prize, when, to his great terror, he said it "*took foot and whipt through the fence.*" Query. Was this a *charm* or a *fright?*

The account we have of fowls that stood in a "circular manner around a large black snake," requires more particular attention; as a little reflection will enable us to draw an important conclusion from the fact, and to account for it on a principle much more general than the supposed *charm*. It would appear that all the fowls encircling the snake, were equally under its influence; and yet, it would be rather difficult to conceive that the fascination of his eye could extend to the whole circumference of the circle! The same occurrence has frequently been witnessed with respect to frogs and various reptiles, and yet no person asserts that they possess any fascinating power. In fact, almost every animal has been seen gazing at some novel object with the same appearance of intense curiosity which is so often manifested by birds. Cows and horses are often subject to the same influence, when seen encircling an old stump or heap of brush, which may contain some strange animal or inanimate object partly concealed. A deer will approach within a few feet of a man if he stand in a fixed posture: But if he chance to move the least, that instinctive principle which is ever active, discovers at once, the nature of the object.

Thus it is with the snake. By a small rustling with his tail, he first excites the *curiosity* of birds. They approach the spot; his head is then raised erect, but he is afterwards perfectly motionless. As the intenseness of *curiosity* increases, the birds manifest great agitation by their cries. And we frequently hear of birds being seized by snakes in this position. It is also highly probable that the latter do frequently avail themselves of the advantage given by this singular propensity of birds, and other small animals, and, that it may be one of the means provided for them by nature, to obtain their prey.

Hence I am led to the conclusion, that the operation of that universal principle *curiosity*, will account for the supposed enchantment, and that the cause of the agitation produced by the snakes, must be referred to the animals themselves, and not to the *serpent*. For nature would never have endowed any animal with powers perfectly useless, as must necessarily have been the case, if snakes had possessed the faculty of charming birds, or any animal of such a size, that they could answer them no purpose for food; or when any animal possesses within itself a quality, which would effectually place it within the power of the reptile, if intended by Providence as a means of subsistence.

HUMANITAS.

ANSWER TO QUERY RESPECTING BALLOONS.

AEROSTATION, in the true and primary sense of the term, implies the science of weighing bodies suspended in the air; but modern usage has applied it to the art of navigating the air.

The advantages that one might gain by being able to elevate himself from the earth, and soar at pleasure through the attenuated medium by which it is encompassed, cannot fail to strike the fancy of every individual of our tartigrade race. Not a child but has felt the impulse to achieve wondrous exploits by imitating the swift mode of progression natural to birds. As might be supposed, the inventive genius of man was directed toward the accomplishment of aerial flights, at a very remote

period. And from that day to the present, the art of flying has become as fruitful in schemes and diagrams, and machines, as the chimerical project of perpetual motion.

We are informed by the ancient classics, that Daedalus and his son Icarus, being imprisoned in Crete, undertook to escape by traversing the air. For this purpose they invented wings made of feathers, which they fastened on their bodies by wax. Having taken their departure, Daedalus succeeded in alighting with safety beyond the sea. But his son, soaring too high, had the wax which secured his wings, melted by the heat of the sun. Being thus deprived of his wings, nothing remained for him but to die by the fall which resulted. This story is probably founded on the circumstance that Daedalus invented sails for boats, and made his escape by this means. The mythology of the ancients contains other instances of aerial navigation, equally credible.

In the fourth century before the Christian era, an eminent historian tells us that Archytas invented a flying machine, in the form of a large wooden pigeon, which contained some extraordinary mechanism that enabled it to move through the air.

The celebrated friar Bacon, who lived nearly six hundred years ago, affirms the art of flying to be feasible, and that he himself knew how to make an engine, in which a man sitting might be able to move through the air like a bird. He further declares that there was another person who had actually tried it with success. Bacon never revealed this wonderful secret, but it is believed that it consisted in a couple of large copper globes exhausted of air, which, being much lighter than the atmosphere, would sustain a chair, whereon a person might sit. Another scientific man afterwards proposed the same project, and calculated the size and weight of a globe which would ascend on that principle. It is obvious however, that the idea is fallacious; because, unless the thickness of the body of the globe be increased in proportion to its size, it would be crushed to pieces by the pressure of the air on the outside.

So confident was the famous bishop Wilkins of ultimate success in the art of flying, that he seems to imitate, that in future

years, it will be as usual to hear a man call for his wings when he is going a journey, as it now is to call for his boots.

With regard to the idea of propelling ourselves through the air with wings, suffice it to say, that such an achievement is now generally considered impossible. If wings of a suitable magnitude and lightness were at hand, it would be out of the power of any person to raise himself by them, on account of the insufficient strength of the human arm. Birds are furnished with a powerful muscular structure adapted for supporting their bodies on wing. The strength of this apparatus bears no comparison to the strength of the human arm. If any person think himself strong enough to sustain himself by wings on his arms, let him hang by his hands to some elevated object, supporting on them the whole weight of the body; and if his opinion be not changed in one or two minutes, his arms are stronger than fall to the lot of most men.

History does not record the name of the inventor of soap bubbles. Whosoever he was, whether a school boy or a philosopher, it is certain that he made a nearer approach to the navigation of the atmosphere than all the learned wing makers of the world. Soon after the discovery of hydrogen gas, or inflamable air, the thought of taking advantage of its levity so as to raise small bodies with it, suggested itself almost immediately, to Cavendish and Cavallo, two eminent European philosophers. In 1782, the latter tried a number of experiments with bladders and other vessels inflated with hydrogen; but he did not succeed with any thing except soap bubbles. He was able to fill them with the gas by using a small glass tube tied to a bladder containing a quantity of it. The bubbles instantly ascended with great rapidity. These were the first hydrogen balloons.

When I blow a common soap bubble to a considerable size, it shows a tendency to rise in the atmosphere, although the air it contains is not essentially different in composition from that through which it ascends. In this case, the levity of the little balloon is owing to the heat and consequent rarifaction of the air expelled from my lungs. It is on the same principle, that the air near the ceiling of a stove room is warmer than that which is near the floor. Many of my readers have

felt the heat in the gallery of a meeting house to be almost insupportable, while the persons sitting on the ground floor were suffering with cold. Heat, by virtue of its expansive power, enlarges the bulk of all bodies into which it enters. A portion of air thus heated and expanded, has acquired an increase of volume without a corresponding increase of weight; and consequently, is lighter in proportion to its bulk, than it was when cold. According to a well known law of nature, it must now rise.

Balloons have been inflated by two different substances: heated air, and inflammable air or hydrogen gas. Those in which heated air is used are called fire balloons: and the others, air balloons. The former require a constant supply of heat to prevent the air in them from becoming cool, and the balloons from falling. Hence, they are let off with a sort of fire place attached to them, in which fuel is constantly supplied to the fire. This circumstance has given them the name of fire balloons. On the other hand, hydrogen is a permanent gas; being eight times lighter than atmospheric air, when pure, and retaining its levity under all atmospheric changes. If, therefore, the balloon containing it be air tight, it will ascend and remain in the upper regions until some accident causes the escape of the gas.

Such of my readers as stood in need of these explanations, will now understand from them, the principle on which balloons are constructed. It is not only necessary, however, that the balloon be filled with a medium lighter than the air in which it is to rise, but the whole weight of the machine, including the gas, the substance of the balloon, and all the appendages, must be lighter than an equal bulk of the atmosphere.

The experiments of Cavallo, to which I have referred, succeeded no farther than to inflate soap bubbles with hydrogen gas. In the year 1782, a few months later, two brothers named Montgolfier, in France, commenced experiments with a similar design. They observed smoke to rise in the air, and the clouds to float in the air at a great height; and this suggested the idea of filling a light vessel with smoke in order to make it ascend in the same manner.

We have seen that the credit of the first aerial voyage with a fire

balloon, is due to the French philosophers. The scientific enterprise, or the volatile disposition of that nation, has also gained for them the honor of the first expedition into the regions of air, by means of a hydrogen balloon. On the 1st of December, 1783. MM. Charles and Roberts made an ascension from the garden of the Tuilleries with a balloon inflated with inflammable air. Its form was spherical, and it measured thirty feet in height. It was constructed of gores of silk, varnished with a solution of caoutchouc, or gum elastic. For the purpose of preventing it from bursting in consequence of the expansion of the gas in the elevated and rarer regions of the atmosphere, it was furnished with a valve from which a rope extended to the car beneath ; by pulling this rope, the valve could be opened so as to let out a portion of the gas when required.

The necessary preparations being made, an innumerable concourse of people gazed with intense feelings when the two adventurous voyagers took their stations in the car, and the cannon were fired as the signal of departure. At a quarter before two o'clock, the aerostat ascended with its freight to the height of one-third of a mile, when the passengers made signs of their safety to the astounded multitude below. The wind now wafted them rapidly along over a number of towns and villages. Their flight, as might be supposed, was a subject of inexplicable wonder to the inhabitants who espied them. After a journey of two hours, they descended safely in a field twenty-seven miles distant from Paris. Roberts then got out of the car, and the balloon being thus disencumbered of nearly half its burthen, rose very rapidly to an elevation of more than three thousand yards, or nearly two miles. M. Charles suffered no other inconvenience from so sudden an ascent, than a severe pain in one ear and in part of his face, with some deafness after descending. The barometer fell from 28 to 18 inches; and the thermometer from 47° to 21°. By pulling the valve and letting out a portion of the gas, the aeronaut returned to the earth, and landed, after half an hour's voyage, three miles from his point of embarkation.

In the same month, several experiments with balloons were made at Philadelphia, by Rittenhouse and Hopkinson. By connecting together several small balloons, they enabled a man to ascend to the height of one hundred feet, and to float a considerable distance. But becoming alarmed at the supposed perils of his voyage, he cut open the balloons in order to return to terra firma.

Early in the following year, 1784, repeated balloon ascensions were made. During that year, ballooning became a common diversion throughout Europe. It was no unusual thing for the Parisian ladies to amuse themselves by taking an excursion aloft, in the car of a balloon which was secured by long ropes. Indeed it became fashionable for an aeronaut to take his wife or some other lady, in company with him, to pay a visit to the clouds. In the course of this sketch, I will notice the most remarkable only, of the numerous ballooon ascentions that were accomplished about that time, and subsequently.

In January, 1784, the largest balloon that had ever been made, was sent up from Lyons. It measured more than one hundred feet in diameter, and was inflated with heated air. Not less than seven persons ascended in the gallery of this enormous machine, among whom were Rozier, and Joseph Montgolfier. When they had reached a considerable elevation, the balloon burst on one side, and fell rapidly, to the great alarm of the spectators, and most probably to the adventurous navigators. But they came to the ground without injury.

In May 1784, two Frenchmen, named Maret and Bremond, went up for the second time, in a fire balloon. When they were at a considerable height, the balloon took fire, and it was with difficulty that the lives of the aeronauts were saved.

(To be continued.)

PROCEEDINGS OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

March 3d.

Donations to Cabinet.—A specimen of Tridachna, thirty species of exotic shells, and a specimen of the locust of Egypt, from the Red Sea, obtained and presented by Capt. Geisinger.

A number of geological specimens, consisting of argillaceous rock, and red shale containing veins of carbonate of copper, from Brunswick, N. J. By W. P. Gibbons.

A specimen of the Iguana from Honduras. By J. L. Swain.

Donations to Library.—Annales de Mines, 1re livraison for 1833 and the 4th for 1834. Received in exchange for the Journal of the Academy.

Advocate of Science and Annals of Natural History. By the Editor.

Prof. W. R. Johnson made some observations on thermometers, exhibiting the paradoxical effects of the sudden application of heat and cold; cold being suddenly applied to a hot thermometer causing the mercury to rise before it commenced falling, and heat applied to a cold thermometer, causing a contrary effect. These phenomena were explained by the contraction and expansion of the glass bulb, before the cold or heat could act upon the mercury. Prof. J. also exhibited a modification of the usually sluggish spirit thermometer, by which the action of that instrument is rendered more prompt. This consisted of an elongated bulb of about seven inches in length by three quarters of an inch in diameter, joined to a thermometer tube of fine calibre. Previously to the closing of the bulb, there had been inserted into it another elongated bulb of thin glass, hermetically sealed at both ends, and nearly filling the space intended for its reception. When thus disposed, the remaining space in the outer bulb hermetically sealed, had been filled with colored spirit, and the thermometer finished in the usual manner. On exposing this bulb to changes of temperature, its attainment of the stationary point was found to be more speedy than that of another alcohol thermometer, in which the whole capacity of the outer bulb, was filled with the spirit. This was explained on the well known principle that liquid masses are penetrated by heat, by the motion of their particles, and that spirits of wine having a high specific heat, compared with that of mercury, was therefore less in weight for a

given bulk: on the whole, a less ready indicator of changes in temperature than the metallic fluid.

Prof. W. also described a method of making mercurial thermometers on a principle similar to that of the concentric bulb spirit thermometer, in which, with a view of increasing the amount of apparent expansion, at the same time that greater promptitude was secured, a bulb of very thin wrought iron, the expansion of which is much greater than that of glass, was substituted for the interior sealed glass bulb, and by this arrangement the great *weight* of metal required for filling a large bulb with mercury alone, would be avoided.

March 10*th.*

Donations to Cabinet.—A collection of minerals, comprising two specimens of ligniform asbestos, pykrolite, rhætizite, coloured and white sluphuret of iron in potstone, pyroxene, strontian, andalusite, idocrase, albite and nephrite, in all twelve specimens. By Charles Cramer Esq.

To Library.—Fossil Shells of the Tertiary Formations of N. America. No. 3. By the author T. A. Conrad.

Western Journal of Medical and Physical Sciences. From the Editor.

March 17*th.*

Donations to Cabinet.—Three specimens of Pinna from the Gulf Venice; by Strickland Kneass.

A specimen of *Uromastyx acantinurus* from N. Africa. By Mrs. Capt. Read.

A fossil Lingula from Crawford Co. Pa. By Dr. R. Coates.

Dr. S. G. Morton made some remarks on the fossil *Inoceramus sulcatus* from the Galt on the cretaceous strata of England, stating that Mr. Conrad had sent him a specimen of galt from Alabama containing a species of Inoceramus; thus proving a strong analogy between the formations on the two sides of the Atlantic. Dr. M. also made some interesting remarks on the cretaceous strata of the U. States, proposing three divisions, viz.: the first found in S. Carolina and Alabama, the second in N. Jersey, and the third embracing the arenaceous deposits.

March 24*th.*

Donations to Library.—Geology of East Norfolk, accompanied with a map. By R. C. Taylor. Presented by the author.

March 31*st.*

Dr C. Pickering chairman of the Botanical Committee, made

some observations on the Herbarium of the Academy, stating that a provision was required to preserve that valuable part of the collection. The arrangement of the plants being now completed.

On motion of Mr. H. D. Rogers, it was *resolved*, That a vote of thanks be awarded to Dr. C. Pickering, for the highly successful manner in which he has executed the very arduous task of collating and arranging the herbarium of the Academy.

The following gentlemen were then duly elected members of the Academy.

J. C. Jay, M. D., of N. York, correspondent. G. Mifflin, M. D. resident member.

JOURNAL OF THE WEATHER FOR FEBRUARY, 1835.

Moon.	Ther. Days mo.	Ther. Sunrise	Ther. Mid-day	Ther. 11 P. M.	Barometer. Sun-rise	Barometer. Mid-day	Barometer. 11 P.M	Winds. Morning.	Winds. Force	Winds. Afternoon	Winds. Force	Winds. Evening.	Winds. Force	Clouds. Course of clouds	Clouds.	Rain	Observations.
☽	1	27	34	27	29.40	29.39	29.45	NNW	2	WNW	2	WNW	2	SW	WSW		Partly clear
	2	21	28	18	.71	30.02		NNW	3	NW	3	NW	1	WSW	W		Clear
	3	15	27	20	30.09	30.01	29.96	N	0	E	1	N	1	WSW	NE		Cloudy
	4	15	22	11	29.89	29.81	.83	NE	1	NW	2	NW	1	W	NW		Cloudy—some snow—clear
	5	14	27	22	.87	.81	.79	WNW	2	WNW	3	SW	1	W	W		Mostly clear
	6	27	37	30	.79	.70	.50	SE	0	SE	1	NW	4	SW			Cloudy—snow
	7	13	16	2	.65	.63	.68	NW	3	NW	3	WNW	3	W	NW		Clear
	8	−2	12	5	.68	.75	.98	WbN	4	WbN	5	WNW	3	W			Thin clouds—clear
	9	3	19	12	30.08	30.04	30.01	NW	1	WSW	1	N	1	W			Clear—thin cloud
	10	6	19	15	.01	29.98	29.83	NNW	1	NNW	1	N	0	W			Clear
	11	12	29	20	29.88	.65	.70	N	1	SW	3	NW	2	W	NW		Cloudy—clear
	12	20	31	23	.75	.73	.72	NNW	3	W	2	SW	1	W	NW		Clear
	13	23	39	34	.67	.65	.64	SSW	2	SW	2	S	1	W	NW		Cloudy
	14	37	34	27	.80	30.00	30.21	NE	2	NE	2	NE	2	WSW	SW		Cloudy
○	15	20	24	26	30.23	.21	.20	NE	2	NE	3	NE	2	SW?	E	R.	Cloudy—sleet at 11 P. M.
	16	30	31	31	.05	29.92	.20	NE	2	NE	3	NE	3	SW?	NE	R.	Sleet, very heavy.
	17	32	34	33	29.80	29.74	.67	NE	2	NNE	2	N	1	SW?	NE	1.50	Cloudy—rain
	18	33	44	38	.60	.61	.72	NW	2	NW	2	NW	1	SW	NNW		Mostly cloudy
	19	32	40	35	.80	.81	30.07	NW	2	NW	2	NW	3	W		.04	Rain—cloudy.
	20	29	40	30	30.18	30.18	.19	NE	1	S	1	SW	1	NNW			Clear
	21	29	46	36	.09	29.97	29.90	S	1	SW	1	N	0	SW			Mostly clear
	22	38	59	47	29.80	.72	.74	SW	2	SW	2	NW	1	WSW	NE		Mostly cloudy—some rain
	23	37	34	32	.60	.61	.72	NE	1	NE	2	NE	2	SW?	ENE		Cloudy—snow, 9 A.M.
	24	30	41	29	.80	30.07	.10	NE	2	NE	1	S	0	SW?			Cloudy
	25	33	42	33	30.18	.19	.09	SW	2	WSW	2	W	1	SW	WSW		Cloudy—clear
	26	32	36	28	.09	29.98	29.83	NNW	1	WNW	1	N	1	SW			Cloudy—snow, 11½ P. M.
	27	20	32	23	.70	.60	.83	NNE	2	NNW	2	NW	1	SW			Snow—clear
●	28	6	24	8	.80	.79	30.00	W	2	NW	3	NW	3	W	WNW		Mostly clear
	29																
	30																
	31																

SUMMARY.

Average at sunrise, thermom.	22°57	—barom.		29.87	inch.
Do. mid-day, do.	35°43	do.		29.84	do.
Do. 11 P. M. do.	24°32	do.		29.87	do.
Monthly average, do.	29°00	do.		29.855	do.
Maximum (22d) do.	59°	do.	(15th)	30.23	do.
Minimum (8th) do.	–2°	do.	(1st)	29.39	do.
Range do.	61°	do.		0.84	do.
Warmest day (22d) do.	48°5				
Coldest day (8th) do.	5°				

Proportion of clear weather, ...	11	days.
Do. cloudy do.	17	"
Whole days clear, ...	6	"
Days on which rain fell, ...	4	"
Do. snow fell	3	"
Quantity of rain, ...	1.59	inches.
Do. snow, ...	8.5	"
Do. water, ...	2.59	"
Northerly winds prevailed, (proportion,)	13	days
Easterly do. do. do. . .	7	"
Southerly, do. do. (S. to W.)	10	"

Observations.—No auroras nor electrified clouds. Five easterly storms, three of them with snow, a fourth with a little snow, and the other with a sleet of unusual quantity, which broke down many trees. Winds moderate and not very changeable. Those from the north and west predominated. Rains seldom, and very light, with one exception. But little snow. Temperature of the early part of the month extremely cold; after which the weather moderated until on the 27th winter again came on with severity, for the third time. The cold of this month, though not so intense, in these parts, as that of January, appears to have been more general throughout the United States. On the 7th of the month the mercury was as low as Zero at Charleston, S. C.

MEMOIR ON TEA. By F. Pigou.

With observations by A. Chereau.

So much has been written on tea, of which there is so great a consumption in and exportation from China, that we should be cautious in crediting what may be published as new on the subject. Nevertheless, when the powerful interest it excites is considered, and how much uncertainty and how many errors exist respecting it, the necessity for further details becomes evident, if it can be proved that they are derived from an authentic source. Those given in the present paper are derived from a report made by Mr. F. Pigou to the English East India Company, who had commissioned him to procure all the information possible with respect to the culture and preparation of this article. To accomplish this, as access to the places where it is cultivated is prohibited to foreigners, Mr. Pigou employed intelligent agents, among others, Chou-qua, who made eight journies to the district, and remained there from four to six months each time; the information he thus obtained forms the basis of Mr. Pigou's report.

The Chinese all agree that there is but one species of the tea plant, and that all the difference observable in the teas of commerce, are owing to the soil and preparation. This is a well known fact, and was first stated by Lord Macartney and Sir George Staunton, who observed it in their passage through the tea district, in the progress of their embassy from Pekin to Canton. Besides which, Chou-qua states that many cultivators, especially about Ankoi, mix the leaves of several other plants with those of the tea shrub. This may be verified by examining the tea of commerce, by immersing it in warm water and unrolling the leaves, all the leaves which are not dentate are spurious.

The different species of tea are artificial. Thus the *Bohea* may be changed into *Hyson* at will, and it is the same with all the other kinds. But Chou-qua affirms that experience has shown, that much depends on the cultivation and soil;

so that the *Bohea* will make good or indifferent *Hyson*, according to the locality; however, in the province of Tokein, which is emphatically the tea district, *Hyson* is manufactured in large quantities.

The Bohea district, which forms part of this province, is very mountainous, though the plants are cultivated both on the elevated grounds and in the vallies.

The author has shown that the true *Souchong* is very rare and commands a high price. That sold to foreigners as Souchong, is only the first quality of Congo, and the Congo of the Canton market, is again the first quality of Bohea.

In a tea plantation, (situate on a hill,) there is perhaps but one shrub which furnishes a sufficiently good product to be termed Souchong. And even in this case, the finest and youngest leaves only are classed as such, whilst the rest furnish Congo and Bohea.

Tea harvest. There should be but three gatherings of the leaves, or at most four, (for Souchong but one.) Any attempt to strip the bush beyond this, militates against the goodness of the crop of the succeeding year. The first, which takes place from the middle of April to the end of May, is termed *Loro-tchune;* the second, from the middle of June to the middle of July, is called *Curl* or *Geech-chtune;* the third, from the commencement of August to the end of September, is denominated *San-chtune.*

Tea is never gathered during the winter. The plants last for several years; when they become old, they decline and die, but the root furnishes suckers. The ground is never manured, but is worked with great care. Tea is not gathered leaf by leaf, the whole twig being cut off. The gathering is made at all times of the day, as it is immaterial whether the leaves are wet or dry.

Manner of preparing Bohea. When the leaves are gathered, they are placed in large, shallow baskets to dry. These baskets are disposed on frames in the open air, and exposed to the action of the sun, if it be not too violent. This exposure lasts from morning till noon. The leaves now begin to acquire their aromatic smell. They are then heated

on a stove,* on which a half catty ($\frac{2}{3}$ lb.) is placed at a time; the leaves are twice stirred rapidly with the hand, for the stove is kept very hot, when they are removed with a short brush. On the removal of the leaves from the stove, they are again placed in large flat baskets, and rubbed between the hands, to roll them up, after which they are subjected to the action of milder heat than at first. They are then put in large baskets, suspended over a charcoal fire, well dried, and afterwards spread on a table where they are sorted, and broken leaves &c. removed.

The Congo, according to Chou-qua is twice subjected to the action of the stove, as well as the Souchong: but Youny-shau, another emissary of Mr. Pegou's, says, that Souchong and Congo are not manufactured in this way, but are only two or three times heated over a charcoal fire. He also says that the Souchong, Congo and Hyson, as well as the beautiful Singlo, are beaten with flat sticks, or bamboos, after they have been wilted by exposure to the air or sun, and have acquired sufficient pliancy not to be broken by this operation, which developes the aroma, and deprives them of their acridness.

When Bohea has not been twice stoved, it is considered as badly prepared. In this case the infusion, instead of being green, is yellow. The common tea, used by the lower classes in China, is first subjected to the action of boiling water, which, however, does not prevent its preserving much acrimony, strength and bitterness.

Different kinds of Tea. Peko. This tea is prepared with the leaves of plants of three years of age; but only those are taken which have just expanded, whilst they are still whitish, velvety and covered with a soft down. Shrubs of from five and six years of age may also furnish a certain proportion of Peko, but after this the product becomes Bohea, if the plants grow in the valleys, and Congo if on the hills.

* *Tacht*, a cast iron stove. As the action of heat renders the tea milder, by extracting the oil, the stove gradually becomes coated with an oily crust, which it is indispensable should be removed by washing. Whenever the leaves become moist, they are again placed on the stove. This process augments the weight of the tea, at each repetition.

Lint-sessin. This appears to be composed of very young, convoluted leaves with their petioles; the Chinese do not esteem it—it is not stoved. It is only prepared to please the eye; the leaves are gathered too young to have any perfume.

*Leoo-ching.** This tea is prepared like Bohea, or like the green tea, as the demand may be; but it is generally used for the manufacture of Singlo, for which it is best suited.

Ho-ping. So called from the country where it grows, about twelve days journey from Canton. The Ho-ping is prepared like the Bohea, but with less care, on account of its inferior quality. Wood is used instead of charcoal in drying, which adds to the unpleasant odour which this tea derives from the nature of the soil where it grows.

Honan. This tea grows opposite to Canton. It is prepared in April and May for the Canton market, especially for female use; it is not exported. It gives a reddish coloured infusion. It is worth three candarines a catty; but the best quality will bring twelve candarines.†

Ankoi. So called from the country which produces it, about twenty-four days journey from Canton. It is prepared much in the same manner as Bohea. When this tea is intended for exportation, it is packed in large baskets, similar to those used for Bohea, and heated over a charcoal fire. There is another kind, *Ankio peko.*

Sing-lo and *Hyson.* These teas are prepared in the following manner: after the leaves have been gathered, they are at once stoved, and rubbed between the hands to roll them; after which they are spread on a table to separate them, as they are apt to adhere. This latter operation is performed

* Leoo-ching is a district about eight days journey from Canton; it produces annually 1000 peculs of tea; the pecul is 133⅓ lbs.

† Chinese accounts are kept in tales, maces, candarines and cashes. The tale is divided into 10 maces, 100 candarines, or 1000 cash.

by women and girls, who, according to their proficiency, can prepare from one to four catties a day.

These operations are repeated, and the tea packed tightly in boxes, whilst hot, as otherwise it would break and crumble.

Sing-lo is more powdery than Hyson, and must be fanned twice, whilst a single process of this kind is sufficient for the latter. The *Tunkei*-singlo is the best, arising from the soil which produces it. It grows in the Hyson districts.

Hyson skin is thus called from its resemblance to the skin or pellicle of the Hyson, and is not as much esteemed as that tea. Hyson skin consists of larger but less handsome leaves, of a poor colour, and is known in London by the name of *Bloom tea.* The *gomi* and the *oot sein* are also varieties of Hyson. The leaves of the first are small and twisted, resembling pieces of twisted wire; the oot sein has a shot like form.

Bing tea, has received its name from the person who first prepared it. It grows about a four days' journey from the Hyson district. The leaves of this tea are long and thin, those of Singlo are short and thick.

Mr. Pigou then gives an account of the numerous frauds and deceptions practised in the tea trade.

In the Bohea district, when tea is dear, and probably the same is practised in the other districts, the old and hard leaves are gathered, they are steeped in hot water, and then prepared as usual, after which they are pounded and mixed with other teas, in the proportion of five or six catties to ninety-five of good tea.

The Chinese have also several modes of changing Bohea into green tea; for this purpose, they use the coarse Ankoi, the larger leaves of which are selected; ten catties of these are softened in water, or an infusion of tea, when the leaves are somewhat expanded, they are placed on a heated stove, with a small quantity of powdered *chico*, (a magnesian stone,) and proceeded with as before. The last part of the operation is to sift it. If it is not yet sufficiently green, it is again put on the stove; these processes give the green tinge.

The Ho-ping already described, and which is a Bohea, is often changed into a green, resembling the Leoo-ching, also spoken of. It is then sold at Canton for Singlo. All these manufactured teas, as they may be termed, as well as those of bad quality, are generally mixed with the finer sorts for exportation.

The differences observed in teas depend on the soil. As to the modes of preparation, they appertain to the manufacturer, and are the fruit of his skill, and often of his caprice; sometimes he neglects his fire, as well as other steps of the process; sometimes from economy, he employs wood, and even green wood instead of charcoal, or makes use of straw or other substances, for the inferior qualities. The season also, has much influence on the qualities; they are always best when the temperature is mild.

The Chinese at Canton also endeavour to sell all their teas as fresh, striving to give them this appearance, either by mixing with really fresh tea, or by again stoving them.

It is calculated that of one hundred Chinese, forty only are enabled to drink tea, the remainder using water alone. Many of these latter, after their rice is cooked, fill the cooking utensil with water, and as some of the rice has become burnt, it imparts some colour and taste to the fluid, which is then used instead of tea.

Properties. The Chinese consider the old Bohea as good, they make use of it in fevers to produce perspiration, and they sweeten with an impure sugar, to which they add a little ginger.

Old Hyson is said to be efficacious in obstructions of the stomach from indigestion. When a sense of weight is felt a few hours after a meal, the infusion of Hyson is salutary.

Names. Bohea is pronounced *Voo-yee*, which is the name of the district.

Congo, *Cong-foo.* This tea requires great care in the gathering and preparation of the leaves.

Peko, *Pe-how.* This is the young leaf, whilst still white.

Souchong, *Se on chong*, (a good thing.)

Oo-ching.	From its place of growth.	
Ho-ping.	do.	do.
Ho-nan.	do.	do.
An-koi.	do.	do.
Sing-lo.	do.	do.
Hyson.	He-tchune.	First gathering.

Quantity of Tea gathered in China, yearly.

Singlo	50,000 peculs.
Hyson . . .	4,000
Lonk-ann, or small leaves not exported,	20,000
Mo-i-shan, not exported, . .	2,000
Bing	2,000
Phow-go, a kind of Bohea, . .	2,000
Bohea, including Congo, Peko and Souchong, . .	120 to 130,000
Ankoi, and varieties of green tea,	50,000
Openg . . .	15,000
Ing-ann, a kind of Bohea . .	400
Cow-lou, made into Bohea or Slingo,	2,000
Loot-sien	2,000
	269,400

Journ. de Chim. Med. & Am. Jour. of Pharmacy.

MISCELLANIA.

1. *Unleavened and leavened Bread.* Unleavened bread is made of flour mixed with water. In forming leavened bread, a portion of dough is left till it ferments and becomes sour; this is mixed with other dough, which it causes to rise; carbonic acid gas is evolved, a virous smell perceived, and an active fermentation proceeds. In France, and all other countries where beer is not used, bread is made in this manner; but is neither so agreeable nor so wholesome as that which is lightened with yeast. The yeast bread is of great antiquity, and originated with the French and Spaniards, before vines were cultivated in those countries. Pliny relates that when the brewers had steeped their wheat or ferment in water, and mashed it for their drink of various sorts, they took the scum or froth that gathered at the top by the working of the wort, and used it instead of leaven to work their bread; which, he says, is the reason that their bread is higher and more heaved up than any other.

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2. *Fashionable deformities.* On the first expedition of Park into Africa, arriving at Fatteconda, he waited on Almami, the king, who introduced him as a curiosity to his female circle. The ladies, after a careful survey, approved of his external appearance, with the exception of the two deformities of a white skin and high nose; but for these they made ample allowance, being blemishes produced by the false taste of his mother, who had bathed him in milk while young, and by pinching his nose, elevated it to its present absurd height. Park flattered them on their jet black skins and beautifully flattened noses; but they modestly warned him that *honey mouth* was not esteemed in Boudon.

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3. *The long moss*—TILLANDSIA *usneoides.*—This plant is one of a singular and interesting genus, comprising twenty-six species, which are almost entirely indigenous to tropical America. Bartram gives us an interesting account of the *usneoides.* It fixes itself on a limb or branch, spreading into

short and intricate divarications. In course of time dust collects upon them, and by the moisture which it absorbs, the plant is rendered capable of establishing itself firmly on the tree. It increases in bulk, by sending forth on all sides long pendant branches, which, in their turn, produce others, till at last the spaces between the limbs of large trees become almost filled with this exuberant plant. From the lower limbs, it hangs like streamers, fifteen or twenty feet in length, gracefully waving with the undulations of the atmosphere. Occasionally, the violence of the wind separates huge masses from the trees; cart-loads of it may thus be seen lying on the ground in different places. If any part of the living plant is torn off and lodged on a limb of another tree, it will take root, and ere long cover its destitute friend with its rich curtains of evergreen. Cattle and deer will eat it in the winter season when fresh. It is well adapted and much used for the purpose of stuffing matrasses, chairs, saddles, &c. The Spaniards of South America and the West Indies, work it into cables, which are said to be strong and durable. The manner in which it is prepared for the various purposes alluded to, is by throwing it into shallow ponds of water which are exposed to the sun, where it soon rots, and the outside, furry substance is dissolved. It is then taken out, and spread to dry. After a little beating and shaking it becomes sufficiently clean for use, nothing remaining but the interior, hard, black, elastic filament, entangled together and greatly resembling horse-hair.

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4. *Sibilo of the Africans.* At Sensavan, or Bleuk-klip, nearly in lat. 28° S. there is a ridge of quartz rock, impregnated with *micaceous iron ore*, which, in many places, is collected in nests of considerable magnitude. This iron ore is known throughout southern Africa by the name of *sibilo*, and is used by the natives for colouring their skin. Hither all the surrounding nations repair for a supply of that ornamental, and in their eyes, valuable substance. In some degree it forms an article of barter with more distant tribes, as well as among those in its immediate vicinity, so that its use extends over five degrees of latitude. It is of a reddish color, soft and greasy to the feel,

its particles adhering to the skin, and staining it a deep red color. Burchell says that the skin is not easily freed from these glossy particles, even by repeated washings. The mode of preparing and using it is, simply by grinding it with grease, and smearing it generally over the body, but chiefly on the head. The hair is frequently so much clotted and loaded with an accumulation of it, that it presents the appearance of being filled with lumps of the ore.

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5. *Bhotean Wool.* Mr. Hodgson lately stated, in the Zoological Society of London, that the wool of the *Hunich*, or Bhotean domesticated sheep, is superb. It is suited only to the northern region of Nepâl, suffering much from the heat of the central district. The valley of the Nepâl is situated along the twenty-seventh degree of latitude. The temperature of the springs at Calmandoo, the capital, which is elevated 4784 feet above the plains of Bengal, is sixty-four degrees. Hence, we presume that the climate of our southern states is fully adapted for the cultivation of the above named sheep.

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6. *Discovery of an Ichthyosaurus.* The London Literary Gazette contains a letter from Mr. Roberts, the intelligent historian of Lyme Regis, stating that the extraordinary female geologist of that part of the coast, Miss Mary Anning, has discovered the largest Ichthyosaurus ever found. "The gigantic animal," he says, "must have died, and its bones fallen abroad at the decomposition of the body just before they were covered with lias deposit, which became a layer of limestone. The bones lie as usual in the marl between. This animal, presumed to be the skeleton of the Ichthyosaurus Platyodon, must have been at least thirty feet in length, and of considerable bulk: the great one recently purchased at the British Museum was only half as large. Miss Anning can get but few bones at a time, as the ledges are broken up; so scattered are the bones."

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7. *Noise of the Aurora.* It is a common opinion that exhibitions of the aurora in the Arctic regions, are accompanied

by hissing and crackling noises, occasioned by the electric fluid passing through the atmosphere. This idea has been inculcated by a number of writers who have visited our northern latitudes. The observations of Captains Lyon and Parry, however, refute the doctrine; the former observes that the sudden glare and rapid bursts of those wondrous showers of fire, make it difficult to fancy their movements wholly without sound. He declares that he stood for hours on the ice listening, and at a distance from every sounding body, till he became thoroughly satisfied that no noise proceeded from the aurora. Captain Parry complains that he could not expose his ears to the cold long enough completely to ascertain the point. But nothing was ever absolutely heard. The aurora dimmed the lustre, but did not conceal the stars from view. To Captain Parry the light appeared to assume tints of yellow and lilac; but to Captain Lyon it always resembled that of the milky way, or of very vivid sheet lightning.

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8. *Pine rafts of the Rhine.*—The author of "An autumn near the Rhine," gives the following account of the immense rafts which descend that river:

A little below Andernach, the little village of Namedy appears on the left bank, under a wooded mountain. The Rhine here forms a little bay, where the pilots are accustomed to unite together the small rafts of timber floated down the tributary rivers into the Rhine, and to construct enormous floats, which are navigated to Dortrecht (Dort,) and sold. These machines have the appearance of a floating village, composed of twelve or fifteen little wooden huts, on a large platform of oak and deal timber. They are frequently eight or nine hundred feet long, and sixty or seventy in breadth. The rowers and workmen sometimes amount to seven or eight hundred, superintended by pilots, and a proprietor, whose habitation is superior in size and elegance to the rest. The raft is composed of several layers of trees, placed one on the other, and tied together; a large raft draws not less than six or seven feet of water. Several smaller ones are attached to it by way of protection, besides a

string of boats, loaded with anchors and cables, and used for the purpose of sounding the river, and going on shore. The domestic economy of an East Indiaman is hardly more complete. Poultry, pigs, and other animals, are to be found on board, and several butchers are attached to the suite. A well supplied boiler is at work night and day in the kitchen; the dinner hour is announced by a basket stuck on a pole, at which signal, the pilot gives the word of command, and the workmen run from all quarters to receive their messes. The consumption of provisions in the voyage to Holland, is almost incredible, sometimes amounting to forty or fifty thousand pounds of bread, eighteen or twenty thousand of fresh, besides a quantity of salted, meat, and butter, vegetables, &c., in proportion. The expenses are so great, that a capital of three or four hundred thousand florins (about 35,000*l.*) is considered neeessary to undertake a raft.

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9. *Limit of the American tulip tree on the Mississippi.*—Nuttall observed that the American poplar, LIRIODENDRON *tulipifera*, did not appear on the banks of the Mississippi, south of the Chickasaw bluffs. The Platanus also becomes less frequent, and greatly reduced in magnitude, when compared with the size which it attains along the Ohio. The cotton-wood poplar POPULUS *angulata*, is the largest forest tree which next appears, and is also of the quickest growth.

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10. *Traditionary origin of the Choctaws.*—Du Pratz tells us that this tribe of Indians have a current tradition, that they sprung out of a hill, situated contiguous to Pearl river. Ware informs that this notion is still prevalent among the tribe, and that they continue to visit and venerate the hill. Du Pratz believes them to have emigrated into the country which they now possess.

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11. *Comparative durability of oak and chestnut.*—In the transactions of the Society of Arts, for 1789, there is an account of the comparative durability of the oak and chestnut, when used for posts. Some of each kind were put down at Wellington, in Somersetshire, previous to 1745. About 1763, when they had to undergo repair, the oak posts were found to

be unserviceable, while those of chestnut were very little worn. Accordingly, the former were replaced by new ones of the same wood, while the latter were allowed to remain. In twenty-five years, (1788,) the chestnut posts, which had stood about twice as long as the others, were found to be in much the best condition.

In 1772, a fence was made, partly of oak posts and rails, and partly of chestnut ones. The oak posts had so decayed at the surface of the ground, as to need to be strengthened by spurs, while the chestnut ones required no such support. A gate post of chestnut, on which the gate had hung for fifty-two years, was found to be quite sound when taken up; and a barn constructed of chestnut in 1743, was sound in every part in 1792. Hence it appears, that young chestnut is superior to young oak for wood work that has to be partly under the ground.

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12. *Cultivation of the date palm.*—The date palm is a diœcious tree, having the male flowers in one plant, and the female ones in another. The male flowers are considerably larger than the others, which, instead of stamens, have in the centres of them the rudiments of the dates, about the size of small peas. The difference in the fructification of the wild and cultivated date, though both are precisely the same species of tree, is somewhat remarkable. Wild dates impregnate themselves; but the cultivated ones require the assistance of art: this fact is mentioned by Theophrastus and Pliny; and in every plantation of cultivated dates, one part of the labor of the cultivator consists in collecting the flowers of the male date, climbing to the top of the female tree, and dispersing the pollen on the germs of the dates. So essential is this operation, that if not performed, the crop fails, though male and female trees are growing on the same plantation. Delile, in his Egyptian flora, mentions an instance of this kind which occurred in 1800, in the neighborhood of Cairo. The French and Turkish troops having been fighting all over the country in the spring, field labor of every kind was suspended, and among the rest, the fecundation of the date. The female trees put forth their bunches

of flowers as usual, but not one of them ripened into edible fruit. The pollen of the male trees appears to have been scattered over the country by the winds, and not being sufficiently abundant for reaching the germs so as to insure fructification, an almost universal failure was the consequence. We are told by the elder Michaux, that in a civil war which occurred among the Persians, and which was attended with all the ruinous effects of anarchy, the male date trees of a whole province were cut down by the invading troops, that the fructification of this necessary article of subsistence might be stopped. But the inhabitants, apprehending such a result, had been careful previously to gather the pollen, which they preserved in close vessels; and they were thus enabled to impregnate their trees, when the country was freed from the destroying army. In the *Annales du Museum* it is said that the pollen had thus preserved its powers during nineteen years.

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13. *Purple dyes.*—In Spain, in the southern provinces of France, and along the Mediterranean coasts of Africa, there is found in great plenty, a species of oak, called the Kermes (*Quercus coccifera*), which is remarkable for nourishing large quantities of a small insect (*Coccus ilicis*), which being gathered, forms an article of commerce called kermes. The declivities of the Sierra Morena are covered with the kermes oak; and many of the inhabitants of the province of Murcia have no other mode of living than gathering the kermes. Latreille has united this insect to the cochineal family, which it resembles, not only in its form, but in producing a scarlet dye. Till the discovery of the cochineal insect upon certain species of the *Cactus* in South America, the kermes was the only substance used in dyeing scarlet, from the period of the disuse and loss of the *Murex* and *Buccinum*,—the shell-fish that produced the Tyrian purple of the Romans. The people of Barbary employ the kermes for dyeing the scarlet caps used by the natives in the Levant, and they prefer that of Spain to their own produce. In England, and in other countries where manufactures are extensively carried on, the cochineal has almost entirely superseded the use of the insect scarlet dye of Europe.

14. *Submarine Architecture.*—The National Intelligencer gives a description of a piece of architecture now in progress by the Alexandria Canal Company, under the direction of Captain Turnbull, of the U. S. Topographical engineers. A branch of the Chesapeake and Ohio canal is to cross the Potomac, on its route to Alexandria, and it is to be supported by piers, the foundation of which are on a solid rock. To accomplish this object, a vast coffer-dam has been constructed, the interior of which is about eighty feet long and nearly thirty wide. The *depth* of water to be shut out by this dam is 18 feet, and the depth of *mud* below the depth of water, which mud it was necessary also to remove, was more than 17 feet; so that the building was begun at a depth of thirty-seven feet below the surface of the water. Notwithstanding which, so successful has been the preparations for resisting the vast external pressure of water, that the rocky bottom was laid bare the whole extent of the area enclosed, and even swept clean and dry with brooms before the cement was applied, in which, a few days ago, the first course of stone was laid. The length of the pier now building is, at the base, sixty-six feet, running in its length with the current and tide; its precise breadth we do not remember, but it must be something over 15 feet. The mason-work of the pier is going on rapidly and successfully. It is now above 10 feet in height from the bottom. The whole number of these piers (some of them even larger than this) is to be eight, besides the end piers or butments, and upon them the canal is to be carried, at an elevation of thirty feet above the level of the river. When completed this will be a piece of workmanship unparalleled in the U. States.

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15. *Subterranean Villages.*—All around Tripoli the prevailing rocks are of limestone,—partly of secondary, partly, it is said, of tertiary formation. The Arab inhabitants of the Gharian limestone mountains in Tripoli live *under ground*,—a circumstance worthy of being particularly recorded, on account of its connexion with the ancient history of man, and also his present condition in some countries. Captain Lyon says,—"We

stopped at a nest, I cannot call it a village, where the habitations are under ground. The sheik, on hearing we were under the protection or the bashaw, came to welcome us, and gave us the only hut the place afforded, in which we placed our people and camel-loads. As for ourselves we preferred clearing part of the farm-yard and pitching our tent in it, surrounded by our horses and camels. This place is called Beni-Abbas. As the natives live, as observed, under ground, a person unacquainted with the circumstance, might cross the mountain without suspecting that it was inhabited. All the dwellings being formed in the same manner, a description of the sheik's may suffice for the rest. The upper soil is sandy earth, of about four feet in depth; under this sand, and in some places limestone, a large hole is dug, to the depth of twenty-five or thirty feet, and its breadth in every direction is about the same, being, as nearly as can be, a perfect square. The rock is then smoothed so as to form perpendicular sides to this space, in which doors are cut through, and arched chambers excavated, so as to receive their light from the doors. The rooms are sometimes three or four of a side, in others, a whole side composes one,—the arrangements depending on the number of inhabitants. In the open court is generally a well, water being found at ten or twelve feet below the base of the square. The entrance to the house is at about thirty-six yards from the pit, and opens above ground. It is arched overhead, is generally cut in a winding direction, and is perfectly dark. Some of those passages are sufficiently large to admit a loaded camel. The entrance has a strong wall built over it, sometimes resembling an ice-house. This is covered overhead, and has a very strong, heavy door, which is shut at night, or in cases of danger. At about ten yards from the bottom is another door, equally strong; so that it is impossible to enter these houses should the inhabitants determine to resist. Few Arab attacks last long enough to end in a siege. All their sheep and poultry being confined in the house at night, the bashaw's army when here, had recourse to suffocating the inmates, being unable to starve them out."